

Chronic widespread musculoskeletal pain in patients with obstructive sleep apnea syndrome and the relationship between sleep disorder and pain level, quality of life, and disability

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Abstract. [Purpose] The aim of this study was to ascertain the prevalence of chronic widespread musculoskeletal pain in patients with obstructive sleep apnea syndrome and to assess the relationship between sleep disorder and pain, quality of life, and disability. [Subjects and Methods] Seventy-four patients were included in the study and classified as having mild, moderate, or severe obstructive sleep apnea. Chronic widespread pain, quality of life, and disability were evaluated. [Results] Forty-one patients (55.4%) had chronic widespread pain. Female patients had a higher incidence of chronic pain, and female patients with chronic pain had higher body mass indexes, pain levels, and disability scores than did male patients. Physical component scores of female patients with chronic pain were lower than those of male patients. No correlation was observed between the degree of sleep disorder and severity of pain, pain duration, disability, or quality of life in obstructive sleep apnea patients with pain. [Conclusion] This study showed a 55.4% prevalence of chronic widespread pain in patients with obstructive sleep apnea and a greater risk of chronic pain in female than in male patients. Female patients with obstructive sleep apnea and chronic pain have higher pain and disability levels and a lower quality of life.

Key words: Obstructive sleep apnea syndrome, Chronic pain, Musculoskeletal

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INTRODUCTION

Sleep plays a vital role in our lives. It regulates mood and affects learning and memory¹⁾. Obstructive sleep apnea syndrome (OSAS), a condition characterized by frequent episodes of upper airway collapse and repeated episodes of apnea and hypopnea during sleep, can lead to excessive daytime sleepiness²⁾. In many studies, a positive correlation has been found between sleep disorders and chronic pain. Chronic pain is reported by 11–29% of the general population. Between 50% and 89% of chronic pain patients complain of poor sleep and/or feeling unrefreshed upon awakening³⁾. The clinical presentation of OSAS includes snoring, breathing pauses observed by the patients' bed partners, lack of concentration, memory impairment, and psychological disturbances^{4, 5)}. Back pain, temporomandibular myofas-

cial pain, fibromyalgia, and rheumatoid pain are the most frequent conditions that lead to chronic pain. Pain is also a relatively frequent complaint of patients suffering from restless leg syndrome (RLS), which manifests as periodic limb movements during sleep (PLMS) in the majority of patients³⁾. OSAS has been associated with many medical problems, such as cardiovascular diseases, chronic obstructive pulmonary disease, juvenile idiopathic arthritis, ankylosing spondylitis, and neuromuscular disorders^{2-4, 6-9)}. OSAS has also been associated with increased morbidity and mortality, diminished quality of life, workplace problems, and motor vehicle accidents^{2, 4)}. The aim of this study was to ascertain the prevalence of chronic widespread musculoskeletal pain (CWP) in patients with OSAS and to assess the relationship between sleep disorder and pain level, quality of life, and disability.

SUBJECTS AND METHODS

Seventy-four patients admitted to the chest diseases and ear, nose, and throat clinics between January and December 2012 with complaints of choking during sleep and excessive daytime sleepiness, and who were diagnosed with OSAS by polysomnographic (PSG) evaluation, were included in the

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study. Approval by the ethics committee was received from Istanbul Training and Research Hospital. All participants provided informed, written consent in accordance with the Declaration of Helsinki. Demographic characteristics of patients (age, gender, occupation, education level, and body mass index [BMI]) were recorded, and patients were questioned regarding comorbidities and drug use. Exclusion criteria were previously diagnosed musculoskeletal disorders such as osteoarthritis, osteoporosis, inflammatory arthritis, and disc herniation.

Patients underwent one night of sleep recording, which was performed using an Embla S7000 PSG system (Embla Systems, Inc., Broomfield, CO, USA). Electroencephalography, electrooculography, and electromyography (submental and legs) were performed. Breathing was assessed by monitoring chest wall motion and nasal and oral airflow; tracheal sounds were monitored using thermistors. Arterial oxygen saturation was measured using an integrated pulse oximeter. Records of PSG were scored with 30-s epochs for respiratory and oxygenation. Sleep phases were evaluated by the Rechtschaffen and Kales method¹⁰, and respiratory event scoring was based on the American Academy of Sleep Medicine's criteria¹¹ for sleep-disordered breathing in adults. Apnea was defined as a complete cessation of airflow for at least 10 s, and hypopnea was defined as a 50% reduction of airflow for at least 10 s accompanied by 3% oxygen desaturation and arousal from sleep¹². The Apnea-Hypopnea Index was calculated as the mean number of episodes of apnea and hypopnea per hour slept. More than 5 events per hour resulted in the diagnosis of OSAS, with 5–15 events per hour classified as mild, 15–30 events per hour as moderate, and > 30 events per hour as severe OSAS. CWP presence was determined by using the American College of Rheumatology criteria for CWP (pain above and below the waist, on both sides of the body and in the axial skeleton, lasting for 3 months or more)¹³, and pain severity was evaluated using a visual analog scale (VAS). The VAS is a common response option in health outcome studies, often used to measure pain, and is generally presented as a single line of 100 mm with anchor words at either end (e.g., no pain-worst possible pain). Higher scores indicate increased severity¹⁴. Quality of life and disability in patients with pain were evaluated with a health assessment questionnaire (HAQ) and the Short-Form 36 Health Survey (SF-36). Disability was assessed using the anglicized HAQ Disability Index¹⁵, which contains 20 questions grouped into 8 categories. Each item was scored 0–3, and the sum of the scores was divided by 8 to give a final score of 0 (no disability) to 3 (complete disability). The SF-36¹⁶ is a self-administered questionnaire containing 36 items and takes about 5 minutes to complete. It measures health on 8 multi-item dimensions, covering functional status, well-being, and overall evaluation of health. Scores on each subscale range from 0 to 100, with higher scores indicating a better quality of life. The SF-36 is a widely used measure of health status that can be scored to provide either a profile of 8 scores or 2 summary measures of health, the Physical Component Summary (PCS) and Mental Component Summary^{17, 18}.

Statistical analyses were performed with SPSS (SPSS, Inc., Chicago, IL, USA) for Windows version 21.0 statistical

software program. Descriptive data were presented as mean \pm standard deviation. Demographic characteristics were compared between the two groups. Categorical variables were compared using the χ^2 test, whereas continuous variables were compared using Mann-Whitney U tests because variables did not show normal distribution. Mann-Whitney U tests were also used to compare male and female patients with CWP. Correlations were investigated using the Spearman test. A p value less than 0.05 was considered statistically significant.

RESULTS

Seventy-four patients diagnosed with OSAS were enrolled in the study. Among them 41 (55.4%) had CWP. No statistically significant differences were found between patients with CWP and those without CWP in terms of age, BMI, and sleep disorder except for gender (Table 1).

Female patients had more CWP. Female patients with CWP had higher BMIs and higher VAS and HAQ scores than did male patients with CWP (Table 2). PCS scores of female patients with CWP were lower than those of male patients with CWP ($p < 0.05$). No correlation was found between the degree of sleep disorder and severity of pain, pain duration, disability, or quality of life in patients with pain (Table 3).

DISCUSSION

OSAS is a very common sleep disorder and leads to hypoxemia and sleep fragmentation¹⁹. In this study, the prevalence of CWP in patients with OSAS was 55.4%, and female OSAS patients had a greater risk of CWP than did male OSAS patients. Female OSAS patients with CWP also had higher pain levels, higher disability levels, higher BMIs, and a lower quality of life.

CWP is experienced by approximately 8–12% of the population, and most of this group include female patients. Because the prevalence of CWP and fibromyalgia is higher in women, most studies investigating these conditions have been restricted to female subjects²⁰. Female patients in our study had more CWP complaints than did male patients.

Pain and sleep influence each other in many ways, and the relationship between them seems to be bidirectional²¹. Multiple biological and psychological factors may initiate and maintain pain²². Among the factors affecting pain sensitivity are quantity and quality of sleep, which are both important in maintaining homeostasis of pain-regulatory processes²¹. Sleep disturbances are a common problem in patients with chronic pain²³, and evidence suggests that sleep loss causes hyperalgesia²⁴. Data from patients with OSAS supports a correlation between sleepiness and pain sensitivity²⁵.

Central hypersensitivity is important in chronic pain patients²⁶. Studies suggest that sleep disruption is related to an increase in inflammatory mediators. Disordered sleep leads to an increase in secretion of interleukin 6 and tumor necrosis factor alpha levels, and increased inflammatory mediators may lead to pain²⁴.

Most studies investigating the relationship between sleep and pain have focused on sleep disturbances in pain patients, and few studies have investigated chronic pain in OSAS

Table 1. Comparison of demographic properties of patients with and without CWP

		Patients with CWP (n:41)	Patients without CWP (n:33)
Gender (male/female) n		18/23	26/7**
Age (years) (mean±SD)		54.71±8.28	50.67±11.40
BMI (kg/m ²) (mean±SD)		32.28±5.33	31.03±6.81
Education n (%)	Illiterate	2 (4.9%)	0
	Primary school	28 (68.3%)	21 (63.6%)
	Secondary school	1 (2.4%)	5 (15.2%)
	High school	7 (17.1%)	6 (18.2%)
	University	3 (7.3%)	1 (3.0%)
Sleep disorder n (%)	Mild	10	9
	Moderate	14	5
	Severe	17	15
	Simple snoring		4

CWP: chronic widespread pain; n: number of patients; SD: standard deviation; BMI: body mass index
**p<0.01

Table 2. Pain severity, duration of pain, quality of life, and disability in patients with CWP

	Patients with CWP (n:41)	Female patients with CWP (n:23)	Male patients with CWP (n:18)
Age (years)	54.71±8.28	54.22±9.18	55.33±7.17
BMI (kg/m ²)	32.28±5.33	34.14±6.11	29.91±2.79**
VAS	4.51±1.95	5.35±1.87	3.44±1.50**
Pain duration (months)	62.37±66.19	79.43±76.07	40.56±43.81
PCS	42.91±10.85	38.15±11.70	49.0±5.43**
MCS	42.63±12.23	40.39±15.19	45.5±6.14
HAQ	4.46±4.99	6.48±5.68	1.89±2.02**

Data are presented as mean±SD. CWP: chronic widespread pain; n: number of patients; SD: standard deviation; BMI: body mass index; VAS: visual analog scale; PCS: Physical Component Summary; MCS: Mental Component Summary; HAQ: health assessment questionnaire
**p<0.01

Table 3. Correlations between sleep disorder and pain severity, duration of pain, quality of life, and disability in patients with CWP

		VAS	Pain duration	PCS	MCS	HAQ
Sleep disorder	r	0.069	-0.049	0.068	-0.255	0.055

CWP: chronic widespread pain; VAS: visual analog scale; PCS: Physical Component Summary; MCS: Mental Component Summary; HAQ: health assessment questionnaire
r: correlation coefficient

patients. A recent retrospective study showed that 200 of 393 patients with OSAS had chronic musculoskeletal pain²³). In this study, no significant differences were observed in age, BMI, or gender between the OSAS and OSAS-plus-pain groups; however, 96.7% of subjects in the study were male. In the present study, 30 of 74 subjects were female, and CWP was more common in female than in male subjects. The present study indicates the importance of analyzing patients according to gender in sleep disorders. Differences between genders have been emphasized and investigated previously. Most of the studies investigating gender differences in deep tissue pain indicate that females have greater nociceptive

sensitivity. Some evidence suggests that gender differences in pain may be mediated by gonadal hormones²⁷). However, this is still unclear, and further studies are needed.

Previous investigators have reported a diminished quality of life in patients with OSAS. Chronic musculoskeletal pain has a negative impact on psychological health and daily activity²⁸). The SF-36 was used to evaluate patients' quality of life in the present study because it has the best reliability, validity, and responsiveness for patients with OSAS. Blood oxygen saturation can drop to very low levels during episodes of apnea or hypopnea. This severe oxygen desaturation could be an important factor for a diminished quality

of life⁴). In the present study, the correlation between degree of OSAS and quality of life was analyzed in OSAS patients with CWP. Physical functioning of female OSAS patients with CWP was found to be lower than that of male patients. We did not find a significant correlation between the degree of OSAS and quality of life.

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